

# MONTHLY WEATHER REVIEW,

## FEBRUARY, 1877.

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

### INTRODUCTION.

In compiling the present REVIEW, the usual data, received up to February 14th, have been made use of. The most noticeable features for the month are the severe storms Nos. VII, IX and XI; the continuance of the warm weather, experienced the latter part of January, through the month of February, giving higher average temperatures for all the districts, excepting the South Atlantic and Gulf States; a general deficiency in the rain-fall, excepting Oregon; the absence of destructive freshets; the frequency of lunar halos from the 20th to the 26th; the hatching of grasshoppers in Minnesota, Iowa, Kansas and Nebraska.

### BAROMETRIC PRESSURE.

The general distribution is represented upon chart No. II. The highest reading for the month, 30.88 in., was observed at Alpena, at 7:35 a. m. of the 13th, during the progress eastward of high-pressure area No. VI; the lowest, 29.18 in., at Eastport on the 17th, during the passage of storm No. XI.

*Ranges in Barometer.*—San Francisco, 0.59 in.; San Diego, 0.58; Rocky Mountain stations, 0.43 to 0.70; plains of Kansas, Indian Territory and northern Texas, 0.74 to 0.96; Missouri valley, 1.06 to 1.25; valley of the Red River of the North, 1.24 to 1.38; Upper Mississippi valley, 1.06 to 1.39; Upper Lake region, 1.19 to 1.50; Lower Lake region, 0.98 to 1.21; Ohio valley and Tennessee, 0.81 to 1.14; New England, 0.84 to 1.11; Middle States, 1.02 to 1.18; South Atlantic States, 0.65 to 1.05; Gulf States, 0.54 to 0.75; Key West, 0.45.

*Areas of High Pressure.*—Of these, nine are described below. Nos. VI, VII, VIII and IX were the most decided.

No. I.—In the Review for January this high-pressure area was designated as No. VII. On the morning of the 1st instant it covered the Eastern Gulf and South Atlantic States and eastern Tennessee. During the 1st, 2nd and 3rd it gradually disappeared in advance of low-pressure areas Nos. I, II and III.

No. II.—It appeared in the Missouri valley on the morning of the 2nd, with freezing temperatures from Arizona, New Mexico and Kansas northward and eastward to Wisconsin and Michigan—minimum,  $-3^{\circ}$  at Pembina. On the following morning, with increased pressure, it covered the Northwest and Upper Lake region, with continued cold weather throughout the above-mentioned sections. At 7:35 a. m., 4th, the highest, above 30.40 in., was central over the Lower Lake region, with the temperature generally below freezing from the Lake region eastward. By midnight it was central on the Middle Atlantic coast, after which it rapidly disappeared in advance of low pressure No. IV.

No. III.—During the 3rd the pressure was unusually high at Portland, Or. It apparently moved eastward and reached the Upper Missouri valley on the morning of the 4th. During the day it extended southward, and the morning of the 5th covered the entire country between the Rocky Mountains and Mississippi valley, with freezing temperature as far south as Indian Territory. It continued its southeastward march, and was central in the vicinity of Cairo at 7:35 a. m., 6th. Under the influence of low-pressure areas Nos. V and VI it was gradually dissipated, and lost its distinctive features during the day and night.

No. IV.—appeared in the Lake region on the 7th, with temperatures below freezing at night, thence to the Middle and New England States—minimum,  $-2^{\circ}$  at Parry Sound. During the 8th it was dissipated.

No. V.—It advanced southeastward over Dakota on the 7th. At 7:35 a. m., 8th, the maximum pressure, 30.49 in., was reported from Yankton; minimum temperature, 0°, from Breckenridge. It separated into two distinct areas in advance of low pressure No. VII, which were central on the morning of the 9th over Lakes Huron, Erie and Ontario and in Texas. A light "norther" was produced along the Texas coast, night of the 8th and 9th, for which signals were ordered, although rather late; maximum velocity, 30 miles at Indianola. At 7:35 a. m., of the 10th, these areas covered the Southwest and the Middle Atlantic and southern New England coasts. Morning of the 11th, with increased pressure, it covered the Southern and Middle States and the Ohio valley, and was central in eastern Tennessee. Heavy frosts occurred as far south as northern Florida, and N.E. gales off the South Atlantic coast—Tybee Island, N.E. 54 miles. During the 11th and 12th, as storm No. VII was passing eastward over the northern districts, it lost its identity in the Southern States in advance of the following high-pressure area.

No. VI.—This is the most interesting high-pressure area of the month. Night of the 10th it evidently advanced southward from Manitoba, producing brisk and high northerly winds and rapidly falling temperature in Dakota and Minnesota, in connection with storm No. VII. Morning of the 11th, minimum temperature,  $-8^{\circ}$  at Pembina. During the day it continued southward. At 7:35 a. m., 12th, it was central in the vicinity of Breckenridge, with a barometric reading of 30.84 in., and at Pembina a minimum temperature of  $-24^{\circ}$ . During the 12th its progress was eastward over the Lake region, due to the presence of the disturbance in the Southwest, and charted as No. VIII. High northwesterly winds and gales accompanied its advance. Morning of the 13th the highest pressure covered Lake Huron; at Alpena, 30.88 in. Minimum temperature,  $-5^{\circ}$  at Rockliffe, Canada, and below freezing as far south as Virginia, Kentucky, Missouri, Kansas and New Mexico. During the night of the 12th and 13th high northwest and northerly winds and severe gales were produced in the Atlantic States from North Carolina northeastward, in connection with storm No. VII. At 7:35 a. m., 14th, it reached from Virginia northward over Lakes Ontario, Erie and Huron into Canada, with the highest reading of 30.71 in. at Kingston, and with minimum temperatures of  $4^{\circ}$  at Albany and  $-13^{\circ}$  at Rockliffe, Canada. Morning of the 15th, the isobaric curve 30.40 in. included the country from southwestern New England to South Carolina. During the 15th, under the influence of storm No. IX, which was passing eastward and north of the Lake region, it disappeared on the Middle Atlantic coast.

No. VII.—On the 14th it was apparently felt at Portland, Or., whence it moved southeastward, and reached the Missouri valley during the night of the 15th. At 7:35 a. m., 16th, it covered the country from the Rocky Mountains to the Mississippi valley, and was highest in Nebraska and Kansas, with the temperature below freezing from the Upper Lakes west and southwestward to New Mexico—minimum  $-15^{\circ}$  at Fort Garry. Its course was southeastward, and on the following morning central in the Southwest. It covered the Southern States morning of the 18th, and was highest over Louisiana, with heavy frost in northern Florida. During the day and night it gradually disappeared on the Western Gulf coast, apparently dissipated as storm No. X moved southeastward across the country. Signals were displayed on the 16th at Indianola and Galveston for a light "norther," but barely justified at the former alone.

No. VIII.—During the 18th it appeared in the extreme Northwest, in rear of storm No. X, and was central in Dakota the following morning. The 19th it moved southeastward, and signals were displayed on the Texas coast for a "norther," which were justified by high northerly winds. At 7:35 a. m., 20th, it covered the country from the Lakes to Texas, and was highest, about 30.50 in., in Kansas. Morning of the 21st it was central in Louisiana, but with slowly diminishing pressure, and heavy frosts in northern Florida. As storm No. XI approached the Upper Lake region and moved southward, it disappeared on the 21st along the Gulf coast.

No. IX.—This was the most extensive high-pressure area of the month. It was first felt in Manitoba morning of the 22nd. After storm No. IX passed eastward, this area extended its influence southeastward during the 23rd, 24th and 25th. The minimum temperature of  $-3^{\circ}$  occurred at Pembina, a. m. of the 23rd. The pressure reached its maximum of 30.72 in. at Fort Garry morning of the 26th, with the barometric ridge covering the Mississippi valley. Cautionary Signals were ordered on the Texas coast for light "northers" on the 22nd, 23rd and 26th, but not justified by subsequent dangerous winds. At 7:35 a. m., 27th, this area included the entire country east of the Rocky Mountains, with very generally clear and cold weather, and continued highest in Manitoba; minimum temperature,  $-1^{\circ}$  at Pembina. On the morning of the 28th isobaric curve 30.30 in. included the country from the Upper Lake region to western Tennessee, and to the eastern portions of Kansas and Nebraska. At midnight it was central in Ohio and West Virginia. From the 22nd to the 25th the barometric gradient between this area and storm No. XI was very steep, resulting in high northwesterly winds and gales.

*Areas of low pressure.*—The tracks of the centres of twelve have been charted. Storms Nos. VII, IX and XI were very severe from the Lakes to the Middle Atlantic and New England coasts and Gulf of St. Lawrence, especially the last, which produced severe easterly gales from North Carolina northeastward, with heavy rains, changing to heavy snow north of New Jersey.

No. I.—This is a continuation of the low-pressure area designated as No. XIV, in the January Review. During the 1st light rains fell along Lake Huron, in New York, New Jersey and New England, and rain partly changing into snow from the St. Lawrence valley to Nova Scotia. Brisk to high winds were reported from the Lower Lakes and St. Lawrence valley. Signals had been ordered to be displayed the previous night from Boston to Eastport, and Canadian stations warned, but were not justified. On the 2nd it disappeared to the south and east of Nova Scotia.

No. II.—During the night of the 1st this slight disturbance developed in the Lake region, with occasional thunder-storms in Illinois and Indiana. The 2nd threatening and rainy weather prevailed from Lake Erie to Tennessee, the Middle States and southern New England, and light snows fell along Lake Huron. At night it disappeared off the Middle Atlantic coast. So far as known, dangerous winds did not accompany it.

No. III.—Threatening and rainy weather, at places very heavy, prevailed in Texas and Indian Ty. on the 1st. By afternoon of the 2nd the central depression was south of Corsicana, and the rain-area extended eastward into the Lower Mississippi valley. Cautionary Signals were displayed on the Texas coast for a light "norther," but not justified. During the 3rd threatening and rainy weather was reported as far eastward as Tennessee and the North Atlantic States, and clear or clearing weather from the Southwest. The 4th signals were ordered for the North Carolina coast, but rather late and lowered too soon: maximum velocities, at Kittyhawk NE. 30, and Cape Hatteras NE. 44 miles. During this day rainy weather continued in the South Atlantic States, clearing weather followed from Tennessee to the Gulf, and at midnight it appeared as an elongated depression reaching from southern Ohio to northeastern Florida. At night the rain-fall was very heavy along the North Carolina coast, over which it passed into the Atlantic on the 5th. Off Cape Cerveral, Fla., heavy N. and NE. gales were experienced.

No. IV.—Diminishing pressure, southerly winds and increasing cloudiness in the Lake region and St. Lawrence valley, on the 4th and 5th, indicated the approach of a disturbance from Canada. At midnight, 5th, it was central in the vicinity of Quebec. During the 6th it disappeared eastward over Nova Scotia, accompanied by frequent light snow from the northern portion of New York east and northeastward. It was followed by high westerly winds at places, and, on Mt. Washington, a NW. storm.

No. V.—This storm moved southeastward over Manitoba during the night of the 5th. Although its centre passed at some distance north of the Lakes on the 6th, yet cloudy and threatening weather and brisk to high southerly or westerly winds were produced in that section. Canadian stations were warned of its approach, and the signals displayed at Milwaukee and Grand Haven were justified: maximum velocities, Escanaba W. 28, and Grand Haven SW. 27 miles. 7th, light snows fell in northern New York and New England, St. Lawrence valley, New Brunswick and Nova Scotia, with high winds occasionally, viz: Sandy Hook W. 28 miles, Mt. Washington NW. storm, and on the 8th at Thatcher's Island NW. 36 miles.

No. VI.—During the 7th this storm crossed Florida, accompanied by rainy weather thence to the South Carolina coast, and thunder-storms in Florida. Signals were ordered from Key West and St. Marks to Charleston, but justified at Tybee Island alone. At Punta Rasa an hourly wind-velocity of 30 miles was recorded at 4:35 p. m. On the morning of the 8th, in connection with high pressure No. IV, high winds were produced on the North Carolina coast; at Cape Hatteras NE. 34 miles. It is probable that it passed northeastward over Bermuda, where a very destructive northerly gale occurred on the 10th. For several days previous, heavy showers had prevailed, with easterly winds veering to southerly, and morning of the 10th heavy thunder-storms.

No. VII.—During the night of the 8th rainy weather prevailed at Portland, Or. This storm probably crossed northern Montana on the 9th. Decreasing pressure and increasing, warm southerly winds throughout the Northwest and Upper Lake region indicated its approach. Heavy snow fell at Virginia City the 10th, and the central depression passed over Dakota to southern Minnesota. To the westward brisk and high northerly winds, with cold weather, prevailed; to the eastward increasing, warm southerly winds. During the 11th, as the central depression passed eastward, a barometric trough extended towards Texas, in which the precipitation was very light. Maximum velocities, Grand Haven NW. 32, Milwaukee NW. 27, Escanaba, N. 32 miles, for which there was a failure to display signals. High pressure No. VI succeeded this storm very rapidly, causing a very steep barometric gradient between them, and, as a result, severe westerly and northerly gales, on the 12th and 13th, from the Lower Lakes to the Middle Atlantic and New England coasts and Gulf of St. Lawrence. Threatening weather, with frequent light rain or snow, accompanied them, changing to heavy snow in the vicinity of the mouth of the St. Lawrence. Cautionary signals were ordered on the 12th from North Carolina to Maine, and some of the Canadian stations notified of its approach, with the following result: Erie W. 36, Father Point N. 50, Eastport NW. 40, Boston and Thatcher's Island NW. 48, Wood's Holl SW. 36, New London NW. 38, New York NW. 46, Flushing, N. Y., NW. 54, Sandy Hook NW. 60, Barnegat NW. 39, Cape May NW. 64, Cape Henry N. 44, Kittyhawk N. 50, Cape Lookout NE. 40. The lowest barometric reading, 29.47 inches, occurred at Halifax at 4:35 p. m., 13th. Northerly gales continued in the Atlantic States and Gulf of St. Lawrence during the



13th, diminishing in force at night. On Mt. Washington a velocity of NW. 120 miles was recorded. The storm-centre passed eastward beyond Nova Scotia on the 14th, with a continued NW. hurricane on Mt. Washington.

No. VIII.—The centre of this disturbance apparently moved to the southward of California, Arizona and New Mexico, in the southern portions of which threatening and rainy weather accompanied it on the 10th. At Santa Fé there was a heavy snow-fall during the 11th, with the rain-area covering Texas, Indian Territory and westward, and with thunder-storms in former. The 12th light snow fell in New Mexico and Kansas, with rainy weather thence to Lower Mississippi valley and Texas coast. The central depression crossed Texas. Cautionary signals displayed from midnight of the 11th at Indianola and Galveston for a "norther" were verified by subsequent wind-velocities of N. 34 miles. During the 13th threatening and rainy weather prevailed in the Gulf States. The centre disappeared into the Gulf, evidently under the influence of high pressure No. VI, which covered the entire country to the northward. Northeasterly gales were reported from Florida to the North Carolina coast—maximum, Tybee Island, 36 miles. Frequent light rains fell on the 14th in the Gulf States, South Atlantic States and Tennessee, and continued the 15th in Florida, South Carolina and Georgia, with thunder-storms in last, and with gales on the coast—maximum, NE. 40 miles at Tybee Island, and NE. 38 at Kittyhawk. Clearing weather was reported the 16th.

No. IX.—This storm approached the Lake region from Manitoba during the 15th, producing occasional, light snow or rain. On the morning of the 16th signals were ordered for Lake Michigan, but late; at night from North Carolina to Rhode Island, and morning of the 17th from thence to Maine. Warnings were also sent to Canadian stations along Lakes Huron, Erie and Ontario, Halifax and St. John, N. B. They were all justified. Some of the maximum velocities recorded are: Duluth NW. 38, Marquette W. 48, Milwaukee NW. 40, Alpena NW. 31, Cleveland W. 30, Father Point NE. 32, Thatcher's Island NW. 36, Mt. Washington NW. hurricane, New York NW. 48, Sandy Hook NW. 50, Cape May NW. 52, Cape Henry NW. 44, Kittyhawk N. 48 miles, and latitude  $39^{\circ} 37' N.$ , longitude  $67^{\circ} W.$ , heavy SE. gale, veering to WSW. Light snow or rain fell on the 16th from Lake Huron to New York and northern New England; heavy snow the 17th from the mouth of the St. Lawrence to eastern Maine, and partly changing to rain in Nova Scotia. The 17th, 18th and 19th its progress northeast and northward over the Gulf of St. Lawrence was very slow. On Mt. Washington the maximum hourly wind-velocity of the month, 132 miles, was reached on the 18th. From the 16th to the 17th the central depression was very much diminished, which, taken in connection with the reports of gales and hurricanes off the coast on the 16th, and the northwesterly gales along the coast on the 16th and 17th, would seem to indicate the approach of a storm-centre from the southward, and that the two apparently combined.

No. X.—Similar to the last, this appeared in Manitoba night of the 17th. Morning of the 18th signals were raised at Milwaukee and Grand Haven and justified; at latter S. 29 miles. During this day snow fell from Lake Superior to the Lower Lakes. At midnight and the following morning signals were ordered from North Carolina to Massachusetts, the majority of which were reported justified—maximum velocities: Cape Lookout SW. 40, Kittyhawk N. 44, Cape May N. 40, Barnegat N. 34, Port Huron N. 34, and Erie N. 32 miles. Very light precipitation, in the form of rain, accompanied it on the 19th from the Middle States and North Carolina to the central Gulf States, with thunder-storms at night in South Carolina and Georgia. Clearing weather succeeded it on the morning of the 20th in the East Gulf and South Atlantic States. During the day vessels experienced in lat.  $34^{\circ} N.$ , long.  $74^{\circ} W.$ , heavy SSW. gale, veering to NNE., and  $30^{\circ} 40' N.$ ,  $79^{\circ} 30' W.$ , strong N. gale.

No. XI.—The path of this storm was a remarkable one. Apparently it was felt at Portland, Or., where heavy rains fell during the 19th and 20th; night of the 20th light rain at Salt Lake City and light snow at Virginia City. Warm, southerly winds and falling barometer from Kansas to Manitoba indicated its approach, and, morning of the 21st, it was apparently central north of Minnesota. During the afternoon threatening and rainy weather, with brisk and high northerly winds, prevailed from Manitoba to Nebraska. By midnight it was central near Duluth, with a barometric trough extending towards Texas, when signals were ordered for Milwaukee and Grand Haven. Maximum velocities occurred at Ft. Sully NW. 45, Pike's Peak gale, North Platte NW. 44, Escanaba and Dodge City N. 38, and Grand Haven S. 31 miles. During the 22nd clearing weather was reported from Dakota and Minnesota, and the rain-area extended southward to the central and eastern Gulf States, with brisk and high northerly winds from northern Texas to Dakota and Minnesota. Signals displayed on the Texas coast for a "norther" on the 22nd and 23rd were reported as not justified. The latter date, as the storm approached the coast, it became very severe, and was accompanied by heavy rains, with thunder-storms from Virginia to New Jersey. Signals were ordered from North Carolina to Maine, and fully justified—maximum velocities: Cape Lookout SW. 34, Cape Hatteras SE. 40, Cape May E. 36 and NW. 44, Philadelphia E. 41, Atlantic City and Barnegat E. 52, Sandy Hook NE. 59, New York NE. 48, Flushing, N. Y., NE. 75, New London, Boston and Portland NE. 36, and Eastport NE. 34 miles. During the 24th the rain very generally changed to heavy snow from Pennsylvania northeastward. The 25th it was succeeded by clearing but cloudy weather in the Middle and Eastern States and St. Lawrence valley. Minimum barometer, 29.36 in.,

occurred at 7:35 a. m. of the 24th on the New Jersey coast, while off the coast, on board the schooner "Addie Fuller," it was reported as low as 29.24 in.

No. XII.—During the night of the 25th this storm produced light rains along the California coast, and occasional thunder-storms. The 26th rainy weather was reported from Utah, Arizona, New Mexico and the southwestern portion of Texas, and light snow from northern New Mexico to western Nebraska and southern Wyoming. The 27th rainy weather continued from the southwestern half of Texas to Arizona, and snow fell at Virginia City; in Texas thunder-storms accompanied it. During the 28th clearing-up weather followed in Arizona, Utah and New Mexico; the rain-area included Kansas, Indian Territory, Louisiana and Texas, with thunder-storms in last. At midnight it was central between Galveston and Indianola, with a barometric trough extending towards Dakota, and light rain or snow commenced falling in the northern portions of Minnesota and Dakota. During the 1st and 2nd of March it progressed northward towards Lake Huron and thence northeastward, and increased very much in extent and severity, including the entire country east of the Rocky Mountains, but its subsequent history belongs to March. Cautionary signals were ordered for the Texas coast morning of the 28th, and justified at Indianola alone by a velocity of NW. 31 miles.

*Vessels experiencing storms at sea.*—Reports of same have been numerous, of which the following are given: 2nd, lat. 51° 15' N., long. 12° W., strong W. to SW. gales, with heavy squalls of hail and high sea for three days. 4th, 51° 26' N., 13° 29' W., strong W. gale and high sea. 9th, 44° N., 45° 33' W., strong W. gales, high seas and snow squalls; 44° 30' N., 46° 21' W., strong WNW. gale and high sea. 10th, 44° 44' N., 50° 30' W., heavy WNW. gale for three days; 49° N., 29° W., hurricane NW.; 42° 28' N., 48° 52' W., strong W. by N. gales and high seas; 46° 09' N., 42° 45' W., strong WNW. gale and high seas; off Bermuda, heavy SE. shifting to NW. gale. 11th, 47° 06' N., 35° 52' W., strong W. gale, hail and high sea; in the straits of Florida, severe NE. gale until 15th. 13th, 39° 17' N., 73° W., heavy NW. gale; 41° N., 67° 27' W., strong NW. gale; 48° 53' N., 36° 25' W., strong N. gale and high sea; 50° 30' N., 18° 49' W., strong WSW. gale; 25° 30' N., 66° 41' W., severe NE. gale; 20° 09' N., 53° 49' W., heavy SSW. gale veering to NW. 14th, 40° 31' N., 68° 36' W., strong NNW. gale, heavy sea and snow squalls. 15th, 45° 30' N., 39° 10' W., cyclone lasting four hours. 16th, 39° 37' N., 67° W., heavy SE. to WSW. gale; 34° N., 70° 30' W., hurricane NE. to S.; near Bermuda, heavy gale. 18th, 27° 01' N., 61° 55' W., heavy NW. gale for twelve hours, then veering to NE. 19th, 43° 04' N., 45° 52' W., strong SW. to SSE. gale. 20th, 30° 40' N., 79° 30' W., strong N. gale; 34° N., 74° W., heavy SSW. gale for eight hours, then veering to NNE. for thirty hours. 28th, 45° 10' N., 50° 25' W., strong NW. gale, snow squalls and high NW. sea.

## TEMPERATURE OF THE AIR.

The isothermal curves and figures upon chart No. II illustrate the general distribution of the temperature of the air for the present month. A reference to the table upon the same chart will show that the average is above that for many years, excepting the South Atlantic and Gulf States, especially for the northern districts. For the Gulf States alone the average is lower than usual.

*Minimum and Maximum Temperatures*, respectively, for the month: in Maine, Orono, —4°, 40°; Portland, 12°, 49°. N. H., Mt. Washington, —16°, 35°; Auburn, 4°, 64°. Vt., Woodstock, —7°, 50°; West Charlotte, 5°, 53°. Mass., Williamstown, 3°, 48°; Milton, 16°, 58°. R. I., Fort Adams, 14°, 48°; Newport, 16°, 46°. Conn., Colebrook, 9°, 45°; Mystic, 12°, 56°. N. Y., Rodman, —8°, 58°; New York, 16°, 59°. N. J., New Brunswick, 9°, 53°; Salem, 16°, 62°. Penn., Tioga, —5°, 57°; Carlisle, 19°, 68°. Del., Dover, 18°, 64°. Md., New Market, 12°, 62°; Baltimore, 18°, 63°. D. C., Washington, 20°, 67°. Va., Snowville, 12°, 64°; Fort Monroe, 26°, 72°. W. Va., Salem, 14°, 66°; Weston, 16°, 65°. Ohio, Salem, 8°, 59°; Kenton, 16°, 67°. Ind., Richmond, 19°, 60°; St. Meinrad, 23°, 70°. Ill., Riley, 12°, 56°; Carbondale, 20°, 73°. Mich., Northport, 3°, 48°; Detroit, 16°, 58°. Wis., Neillsville, 5°, 50°; Embarrass, 8°, 64°. Minn., Fort Ripley, —20°, 49°; Fort Snelling, 8°, 58°. Iowa, Cresco, 5°, 52°; Muscatine, 16°, 63°. Mo., Corning, 13°, 65°; St. Louis, 27°, 69°. Neb., Norfolk, 9°, 57°; Howard, 14°, 64°. Kan., Fort Hays, 16°, 62°; Great Bend, 19°, 69°. Ky., Danville, 21°, 67°; Louisville, 24°, 68°. Tenn., Knoxville, 22°, 62°; Memphis, 30°, 67°. N. C., Franklin, 15°, 61°; Wilmington, 28°, 71°. S. C., Spartanburg, 23°, 66°; Charleston, 35°, 70°. Ga., Atlanta, 25°, 68°; St. Mary's, 34°, 76°. Fla., Milton, 29°, 75°; Key West, 57°, 80°. Ala., Green Spring, 26°, 68°; Carlowville, 32°, 73°. Miss., Vicksburg, 31°, 73°. La., Baton Rouge, 29°, 78°; Lake Charles, 38°, 78°. Tex., Fort Richardson, 18°, 66°; Ft. Brown, 37°, 81°. Ark., Mt. Ida, 21°, 68°; Monticello, 23°, 71°. Ind. Ty., Fort Sill, 19°, 69°; Fort Gibson, 26°, 65°. N. M., Fort Union, 2°, 59°; Santa Fe, 19°, 56°. Col., Pike's Peak, —8°, 22°; Golden, 20°, 66°. Wyo. Ty., Fort Bridger, —3°, 54°; Fort Fred Steele, 6°, 57°. Dak. Ty., Pembina, —21°, 42°; Fort Sully, 3°, 62°. Utah, Coalville, —4°, 56°; Salt Lake City, 15°, 55°. Montana, Virginia City, —5°, 49°. Nev., Camp Halleck, 4°, 59°; Camp McDermitt, 15°, 60°. Cal., Cloverdale, 34°, 74°; San Diego, 45°, 78°.

*Ice.*—At Boonesboro, Iowa, on the Des Moines river, had been from 22 to 30 in. thick—broke up 2nd.) Flushing, N. Y., on Flushing Bay, 14 in. thick, 11th. Wappinger's Falls, N. Y., pond ice, 18 in. thick, 16th; ice on Hudson river honey-combed and open in places, 21st. Oregon, Pa., pond ice 20 in.



thick, 28th. Lunenburg, Vt., ice on ponds and streams 24 in. thick, 28th. Ice harvested 12 to 13 in. thick on Lake Champlain, at West Charlotte, Vt.

*Frost in the ground.*—At Council Grove, Kan., frost out of the ground, 2nd. Sandy Springs, Md., in southern exposures, frost disappeared from ground by 10th. Howard, Neb., frost nearly out of ground by 20th. Keokuk, frost out of ground, 21st. Flushing, N. Y., no frost in ground, 22nd. Kenton, Ohio, frost out of ground, 25th. Clear Creek, Neb., during winter ground frozen to a depth of 30 in., at close of month had thawed 8 or 10 in. Freehold, N. J., no frost in ground to a depth of 6 in. Brookhaven, N. Y., frost out of ground, and South Hartford, N. Y., ground having been protected so long by snow, the frost is largely out of ground.

## PRECIPITATION.

Upon chart No. III is represented the amount of rain-fall, including melted snow. For Virginia City the total is 0.73 in. At Portland, Or., the fall has exceeded the average. In the remaining sections there has been a deficiency.

*Stations reporting the precipitation zero or not sufficient to measure.*—Fort Wayne, (Detroit,) Port Huron and Litchfield, Mich.; Fort Ripley, New Ulm and Minneapolis, Minn.; Independence, Iowa; Webster, N. C.; Beloit, Wis.; Camp Sheridan, Neb.; Fort Laramie, Fort Sanders and Camp Stambaugh, Wy.

*Stations reporting one-tenth of an inch, or less, of precipitation for the month.*—Fort Abercrombie, Fort Seward, Pembina and Firesteel, Dak.; Fort Snelling, Duluth, St. Paul and Breckenridge, Minn.; Fort Fred Steele, Wyoming; South Pueblo, Col.; Chicago, Rockford, Riley, Havana and Peoria, Ill.; Fort Wayne, Ind.; Rockford, Independence, Cresco and Davenport, Iowa; Detroit, Grand Rapids, Northport and Grand Haven, Mich.; Wet Glaze, Mo.; Vermillion, N. Y.; Little Mountain, Hudson and Toledo, Ohio; Snowville, Va.; Bloomfield, Wautoma, Neillsville and Milwaukee, Wis.; Rockliffe and Kingston, Canada.

*Maximum rain-falls for the month.*—Melissa, Tex., 13.06 (?); Brownsville, Tex., 7.99; Portland, Or., 7.56; Austin, Tex., 6.94; Denison, 6.89; Corsicana, 6.84; New Ulm, Tex., 6.75; Boerne, Tex., 6.46; Cape Hatteras, 5.85 inches.

*Heavy Rains.*—Melissa, Tex., from 7 a. m. 1st to 12:30 p. m. 3rd, 5 in., and 9 a. m. 11th to 3 p. m. 13th, 7.31 in. Austin, Tex., from 9 p. m. 1st to 7 a. m. 2nd, 2 in., 7 a. m. 11th to 7 p. m. 12th, 2.24 in., and 12 m. 27th to 12 night 28th, 2.70 in. New Ulm, Tex., from 1:30 p. m. 11th to 8 p. m. 12th, 3.62. Corsicana, 28th, 2.20 in. Denison, 1st and 2nd, 3.28 in., and 12th, 2.26 in. Cape Hatteras, 5th, 3.17 in., and 16th, 2.45 in.

*Snow-fall for the month varies as follows:* from Maine to the northern portions of New York and Pennsylvania, 0.5 to 10 in.; southern New England to Maryland, 0 to 8; West Virginia, 3; western North Carolina, 1.5 to 3.5; Ohio, 0.5 to 1; Upper Lake region, 0.25 to 3; Illinois and Missouri, 0 to 1; Iowa and eastern Nebraska, 0.25 to 2.5; Kansas, 1.25 to 5; Colorado, at Golden, .5, and Summit, 33; Utah, at Coalville, 2 inches.

*Depth of Snow at close of month:* in northern New England reports vary from 12 to 22 inches; southern New England, 0 to 10; northern portions of New York and Pennsylvania, 2 to 20; Upper Lake region, 0 to 0.5; Coalville, Utah, 1 inch.

*Cloudy Days.*—The number of days on which the cloudiness has averaged eight-tenths or more, as reported by the volunteer observers, ranges as follows: New England, 2 to 16; Middle States, 3 to 12; South Atlantic States, 2 to 14; Gulf States, 7 to 14; Arkansas, Tennessee and the Ohio valley, 3 to 11; Upper Lake region, 4 to 8; Northwest, 1 to 12 days.

*Rainy Days.*—The number of days during the month on which rain or snow, in any quantity, has fallen, ranges as follows for the Signal Service stations: New England, 3 to 15; Middle Atlantic States, 3 to 10; South Atlantic States, 5 to 8; Eastern Gulf States, 4 to 11; Western Gulf States, 5 to 12; Indian Territory, Arkansas, Tennessee and the Ohio valley, 4 to 9; Lower Lake region, 3 to 14; Upper Lake region, 3 to 10; Northwest, 3 to 8; Rocky Mountain stations, 5 to 12; California coast, 1 to 7 days.

*Droughts.*—Belvidere, Ill., dryest month in ten years. Waltham, Mass., drought has prevailed. Shelburne, N. H., springs low 13th. South Hartford, N. Y., streams and fountains low during month, but beginning to rise at close. Ruggles, Ohio, a very dry month. Ringgold, Ohio, smallest rain-fall ever recorded in February. Woodstock, Vt., drought still continues; wells and springs dry. Snowville, Va., month dry and water low. Wytheville, Va., on 22nd a drought, no rain having fallen for over a month.

## RELATIVE HUMIDITY.

The average relative humidity for the month, as reported from the Signal Service stations, ranges as follows: in New England, 65 to 78 per cent; Middle Atlantic States, 52 to 66; New Jersey and North Carolina coast stations, 70 to 76; South Atlantic States, 60 to 69; Gulf States, 64 to 76; Indian Territory, Arkansas, Tennessee and the Ohio valley, 59 to 70; Lower Lake region, 65 to 73; Upper Lake region, 66 to 75; Missouri and Upper Mississippi valleys, 63 to 73; Valley of the Red River of the North, 67 to 83; Rocky Mountain stations, 53 to 75; California coast, 70 to 74; Key West, 80; Mt. Washington, 85.

## WINDS.

*Prevailing winds.*—These are shown upon chart No. II, the arrows flying with the wind. At Virginia City they were from the SE. The *maximum* hourly velocities have been given in the description of the movements of high and low-pressure areas, with the dates upon which they have occurred.

*Total movements of the air.*—The following are the largest total movements, as recorded at the Signal Service stations: Cape May, 11,114 miles; Thatcher's Island, 10,828; Sandy Hook, 10,530; Kittyhawk, 10,348; Pike's Peak, 9,376; Cape Lookout, 9,308; Cape Hatteras, 9,305; Barnegat, 8,530; Cape Henry, 8,454. The smallest movements have occurred at the following stations: Virginia City, 1,796 miles; DuBuque, 1,943; Salt Lake City, 2,411; Vicksburg, 2,464; Lynchburg, 2,484; Nashville, 2,497; Augusta, 2,550; Baltimore, 2,841; Shreveport, 2,865; Denver, 2,997.

## VERIFICATIONS.

*Indications.*—As worked up three times daily, and issued to the public at 1 a. m., 10:30 a. m. and 7:30 p. m., they have been carefully compared with the actual conditions during the succeeding twenty-four hours, and the following result obtained, viz: the percentage verified averages 83.8 for New England; 82.0, Middle States; 85.6, South Atlantic States; 82.2, Eastern Gulf States; 82.9, Western Gulf States; 82.1, Tennessee and the Ohio valley; 84.6, Lower Lake region; 89.3, Upper Lake region; 84.9, Upper Miss. valley; 84.5, Lower Missouri valley. For the whole country the average verified is 84.2 per cent. By elements the percentage verified averages 88.1 for the weather; 84.1, wind direction; 80.6, temperature; 83.0, barometric changes. There were 14 omissions to predict, (11 for temperature and 3 for barometer,) out of 3,360, or 0.42 per cent.

*Cautionary Signals.*—Grand Haven and Milwaukee are the only Lake stations at which signals were displayed, owing to the suspension of navigation. Out of 127 signals ordered to be hoisted along Lake Michigan, the Gulf and Atlantic coasts, 106 were reported justified, but 25 of these were late; 21 not justified; 11 lowered too soon, especially on the morning of the 18th, along the New Jersey and New England coasts; 9 kept up too long. From scattered stations, excepting on the 12th and 18th, 36 cases are reported in which the hourly wind-velocity reached 25 miles and over without the display of signals.

## NAVIGATION.

Upon chart No. III is a table giving the highest and lowest water-marks, with the dates upon which they occurred. The *Red* river rose slowly throughout the month. *Missouri*: at Yankton the ice passed out on the 21st; Omaha, ice broke up on 21st; Plattsmouth, Neb., commenced breaking up, but gorged 10th, melting and floating away 17th; Leavenworth, breaking up 8th, gorged 9th, opened 12th. *Mississippi*: at St. Paul the ice disappeared below bridge on the 27th; La Crosse, opened 27th; Dubuque, ferry opened 17th, ice drifting 25th, open earlier than usual; Davenport, ice moved out 21st; Muscatine, 19th; Fort Madison, 17th; Keokuk, channel clear 18th; St. Louis, ice broke up 1st, heavy floating-ice 5th, navigation resumed 6th; Chester, Ill., gorge broke 4th, opening navigation below St. Louis; Cairo, a steady decline of 14 ft. 3 in. to the 6th, rise of 4 ft. 1 in. to 13th, then falling to close; below the changes were not important. *Cumberland*: at Nashville, rose 1 ft. 1 in. to 8th, then slowly falling to end. *Tennessee*: changes unimportant, with a slight decline. *Ohio*: at Pittsburgh there was a sudden rise of nearly 8 ft. on the 3rd, gradual decline to the 22nd, then a rise of 1 ft. 2 in. to 26th; Cincinnati, a rise of nearly 14 ft. from 2nd to 8th, then falling to close; Louisville, rose 3 ft. from 2nd to 9th, after which the decline was continuous. *Savannah*: at Augusta, a sudden rise of 13 ft. 7 in. occurred on the 5th, slowly fell to the 16th, and oscillated a few inches daily to end of month. Ice broke up 3rd, at Cleveland, on Cuyahoga river. Northport, Mich., harbor clear of ice 6th. Salem, N. J., navigation opened 8th. Flushing bay, N. Y., clear of ice 22nd. *Hudson* river: navigation resumed on 28th at Wappinger's Falls and West Point. Narragansett bay open at Fall River, Mass., 1st. New Bedford, Mass., harbor clear below bridge 15th.

## TEMPERATURE OF WATER.

As heretofore, the maximum and minimum temperatures, with the average depth of the water, are given in the table on chart No. II.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms.*—1st, Martinsville, Ill.; Baxter Springs, Kan.; Indianapolis, Ind. 7th, Daytona, Fla.; Indianola, Tex. 9th, Gainesville, Ga.; Murphy, N. C.; St. Marks, Fla. 11th, Austin, Tex. 15th, Brownsville, Tex. 16th, Cape Hatteras, N. C. 19th, Aiken, S. C. 20th, Tybee Island, Ga. 22nd, Monterey Co., Cal. 23rd, Milford, Del.; Salem and Cape May, N. J.; Capeville and Hampton, Va. 24th, Fort Craig, N. M. 25th, Monterey Co., Cal. 27th, Austin, Tex. 28th, New Ulm, Austin, Boerne and Indianola, Tex.

*Distant Lightning.*—1st, Decatur, Ill. 9th, Tybee Island and Forsyth, Ga. 10th, Cape Hatteras. 17th, Golden, Col. 19th, Atlanta, Ga., (with heavy rain.) 23rd, Atlantic City, N. J. 28th, New Orleans.

*Auroras*.—1st, Geneseo, Ill.; Pembina. 2nd, Geneseo, Ill.; Independence and Cresco, Iowa; Duluth. 3rd, Nora Springs, Iowa; Escanaba; Pembina. 4th, Escanaba. 8th, Duluth. 9th, Manitowoc, Wis.; Rochester. 10th, Waltham, Mass.; Duluth; Rochester. 11th, Duluth; Eastport; Pembina. 12th, Cornish and Gardiner, Me. 13th and 15th, Gardiner, Me. 16th, Monticello and Davenport, Iowa; Contookville, N. H. 17th, Waltham and Cambridge, Mass.; Davenport; Pembina. 20th, Waltham, Mass.; Pembina. 24th, Fort Brady, Mich. 28th, Boonsboro, Iowa.

## OPTICAL PHENOMENA.

*Solar Halos*.—1st, Ind., Iowa, Kan., Mich., Neb., N. H., N. Y., Wis. 2nd, Ga., Ill., Mass., N. H., N. Y., R. I., S. C. 5th, Conn., Me., Mass., N. H., N. J., N. Y. 6th, Ala., La., Miss., S. C. 7th, D. C., Ill., Iowa, N. C., Tenn., Va., W. Va. 8th, Ala., Ill., Minn., N. Y., N. C., S. C., Tenn. 9th, N. Y., N. C., Tenn. 10th, Col., Kan., Minn., S. C., Tenn. 11th, Dak., Ill., Ind., Mich., Minn., N. Y., Ohio. 12th, Conn., Dak., Ga., Ill., Neb., R. I., S. C. 13th, Ill., Iowa, Wis. 14th, Ill., Md., Ohio, Penn. 15th, Ind., Iowa, Me., Neb., N. H., N. Mex., R. I. 16th, Me., Mo., Ohio. 17th, Ohio. 18th, La., Penn. 19th, Me., N. H., Ohio, S. C., Tenn. 20th, D. C., Iowa, Mich., N. Y., Tenn., Tex. 21st, Tenn. 22nd, Ga., Mass., Mich., N. H., N. Mex., N. Y., Ohio, Penn., Vt., Wis. 23rd, Ga., Me., N. H., N. Mex., N. Y., R. I., Vt. 24th, Mich., N. Mex. 25th, Kan., Mich., Wis. 26th, Iowa, S. C. 27th, Dak., Minn., Ohio, Tenn. 28th, Col., Conn., Me., N. Y., Tenn., Va.

*Lunar Halos*.—1st, Ga., Kan., N. Y., N. C., Ohio, Utah. 2nd, Dak., Kan., Mass., N. J., N. Y., N. C., Penn. 3rd, Iowa. 4th, Mich. 5th, N. H., N. Y. 16th, Mo., Neb. 17th, La., Tenn., Tex. 18th, Ala., Conn., Fla., N. Y., Tenn., Tex. 19th, N. Y., Fla., Dakota. 20th, Dak., Kan., Me., Md., Mass., N. J., N. Mex., N. Y., N. C., Ohio, Penn., Tenn., Tex., Va., W. Va. 21st, Ala., Cal., Fla., Ill., Ind., Iowa, Ky., Mich., Minn., Miss., Mo., N. H., N. J., N. C., Ohio, Penn., Tenn., Vt. 22nd, Cal., Conn., D. C., Fla., Md., Mich., Minn., N. H., N. J., N. Mex., N. Y., N. C., Ohio, Penn., Tex., Utah, Vt., Va., W. Va., Wis. 23rd, Ala., Col., La., Mass., N. H., N. J., N. Y., N. C., Tex., Wyoming. 24th, Col., Fla., Ga., Ind., Kan., La., Mich., Miss., Mo., Neb., N. J., N. Y., N. C., Tex., Utah, Wis., Wyo. 25th, Ala., Fla., Ill., Ind., Kan., La., Mich., Minn., Mo., N. J., N. Y., N. C., Ohio, Tenn., Tex., Wis. 26th, Ala., Fla., Ill., Iowa, Kan., Minn., Mo., N. J., N. Mex., N. C., Ohio, Tenn., Tex., Vt. 27th, Ind., Miss., Mo., N. Y., N. C., Ohio, Tenn., Vt. 28th, Ill., Ind., Iowa, Ky., Mo., N. C., Ohio, Tenn., Wis.

*Mirage*.—Neb.: Geneva, 1st. Kan.: Ellinwood, 1st, 2nd, 3rd, 4th. 5th, 6th; Dodge City, 17th. Minn.: Breckinridge, 2nd, 9th, 12th, 24th, 25th, 26th, 27th; Moorhead, 2nd, 5th, 6th, 7th, 8th, 12th, 27th, 28th; Duluth, 17th. Ga.: Tybee Island, 18th, 25th. Mass.: New Bedford, 20th.

## MISCELLANEOUS PHENOMENA.

*Zoological*—(1) *Birds*.—*Wild Geese* were observed at Hennepin, Ill., flying S., 1st; Decatur, Ill., N., 8th; Belvidere, Ill., E., 8th; Oregon, Mo., 1st; Emerson, Neb., SE., 1st and 3rd; Plattsmouth, Neb., SW., 2nd; Clear Creek, Neb., N., 5th, 6th, 7th, 8th and 26th; Fort Madison, Iowa, N., 1st, 2nd and 6th; Muscatine, Iowa, 2nd; Boonsboro, Iowa, SW., 5th, N., 17th; Nora Springs, Iowa, S., 10th; Rockford, Iowa, N., 10th and 15th; Davenport, S., 20th; Monticello, Iowa, NW., 21st, N., 22nd; Vail, Iowa, S., 22nd, N., 25th; Council Grove, Kan., N., 2nd; Creswell, Kan., N., 5th; Bellefontaine and Carthagena, Ohio, N., 4th; Flushing, N. Y., N., 5th; Starkey, N. Y., 28th; Fort Macon, N. C., S., 7th, 10th, 15th, and N., 18th; Galveston, N., 8th; Melissa, Texas, W., 10th; Bloomfield, Wis., N., 10th; Aecotink, Va., N., 21st; Fall River, Mass., N., 2nd; Jackson, Tenn., N., 23rd and 28th; Santa Fe, N. M., N., 23rd; Fort Gibson, N., 24th; Breckenridge, N., 26th. *Wild Ducks*, at Milford, Ind., 1st; Louisville, Ill., N., 2nd; Decatur, Ill., N., 8th; Dodge City, 4th; Golden, Col., N., 6th; Vail and Monticello, Iowa, N., 7th; Rockford, Iowa, N., 15th; Guttenburg, Iowa, 23rd; Bloomfield, Wis., N., 10th; Emerson, Neb., N., 14th; Carthagena, Ohio, N., 14th; Corsicana, N., 17th; Plattsmouth, Neb., N., 24th and 26th; Creswell, Kan., W., 19th. *Robins*, Oregon, Mo., 1st; Bethel and Bellefontaine, Ohio, 2nd; Vevay, Ind., Plattsmouth, Neb., and Melissa, Texas, 3rd; Brownsville, Penn., and Salem, W. Va., 4th; Ringgold, Ohio, 10th; Merom, Ind., 12th; Jacksonsburg, Ohio, 19th; Tabor, Iowa, 20th; Owing's Mills, Md., and New London, Conn., 22nd; Baxter Springs, Kan., and Urbana, O., 24th; Aecotink, Va., 25th; Havana, Ill., and Bridgetown, Va., 26th; New Bedford, Mass., 28th. *Phoebe birds*, Waltham, Mass., 2nd; Somerset, Mass., 4th. *Blue jays*, Monticello, Iowa, 5th; Jackson, Tenn., 12th. *Killdeer*, Melissa, Tex., 12th; Ft. Madison, Iowa, 25th; Baxter Springs, Kan., 18th. *Sparrows*, Monticello, Iowa, 6th; Embarrass, Wis., 16th; Waupaca, Wis., 26th. *Meadow Larks*, Kenton, Ohio, 12th. *Mocking birds*, Macon, Ga., 6th; Melissa, Tex., 12th. *Red birds*, Jackson, Tenn., 6th; Louisville, Ill., 10th; Melissa, Tex., 12th; Urbana, Ohio, 17th. *Blackbirds*, Louisville, Ill., 10th; Sedgewick, Kan., 26th. *Woodpeckers*, Decatur, Ill., 8th; Louisville, Ill., 10th. *Blue birds*, Ft. Madison, Iowa, 1st; Bethel, Ohio, 2nd; Plattsmouth, Neb., and Melissa, Tex., 3rd; Fall River, Mass., and Brownsville, Pa., 4th; West Chester, Pa., 5th and 10th; Decatur, Ill., 7th; Macon, Ga., 9th; Louisville, Ill., 10th; Vevay, Ind., Muscatine, Iowa,



and Northport, Mich., 11th; Wappinger's Falls, N. Y., 12th; Havana, Ill., 13th; Adrian, Mich., and Jacksonsburg, Ohio, 18th; New Bedford and Mendon, Mass., Oregon, Pa., New London, Conn., and Milford, Ind., 22nd; Accotink, Va., 27th; Detroit, 28th. (2) *Insects*.—*Grasshoppers*, at Vail, Iowa, eggs turned up in plowing, sound and healthy. Tabor, Iowa, ground filled with eggs. Barlingana, Kan., some hoppers hatched out. Breckenridge, Minn., hatching out 8th. Davenport, Iowa, reported hatching out in western part of State, 8th. Kansas City, Mo., 9th., in southern Kansas the warm weather of past ten days has hatched out millions of grasshoppers. Des Moines, Iowa, 7th, the present warm weather has brought millions of grasshoppers to the surface. Plattsmouth, Neb., hatching out in favorable exposures 6th; on the 17th the ground from the surface to a depth of one or two inches was literally full of them. (3) *Frogs* heard at Howard, Neb., 18th. Cleaveland, Tenn., 4th. At Okahumpka, Fla., on the 28th, the ground was covered with small toads.

*Botanical*.—(1) *Trees*.—*Peach trees*, in bloom at Macon, Ga., 20th; New Orleans, 10th; Welborn, Fla., 16th; Aiken, S. C., 20th. *Orange trees* budding at Welborn, Fla., 17th. *Plum trees*, in bloom at New Orleans, 13th; Welborn, Fla., 12th; Aiken, S. C., 12th. *Apricot trees*, in bloom at Lynchburg, Va., 28th. (2) *Vegetables*.—Cloverdale, Cal., vegetables plenty; Weldon, Fla., 24th, early corn up, garden peas plenty.

*Meteors*.—1st, Benettsville, Ky., Corning and Oregon, Mo., Waterburgh, N. Y. 2nd, Fall River, Mass., Corning, Mo., Jacksonsburg, Ohio. 3rd, Monticello, Iowa, Woodstock, Md., Emerson, Neb. 5th, Vevay, Ind. 8th, Corning, Mo., Westerville and Carthage, Ohio. 9th, Corning, Mo., Cincinnati, Ohio, Ephrata, Pa. 17th, Contoocookville, N. H., Tybee Island, Ga. 18th, West Charlotte, Va. 20th, Smithville, N. C. 21st, Westboro and Waltham, Mass., Trenton, N. J., New London and New Haven, Conn. 22nd, Waterburgh, N. Y. 23rd, New Ulm, Tex. 26th, Flushing, N. Y. 28th, Daytona, Fla., Trenton, N. J.

*Earthquakes*.—A light shock was felt at Portland, Me., at 2:30 p. m. of the 18th; a heavy shock at Quincy, Plumas, Co., Cal., 17th.

A shower of stones is reported to have fallen on the 16th in Social Circle, Walton county, Georgia, varying in size from a hen's egg to that of a man's two fists, irregular in shape, dark grayish color, interspersed with a bright, shiny substance resembling mica. The shower was brief, extended over about four acres of ground and followed an explosive sound.

*Polar Bands*.—Ga., Tybee Island, 8th. Iowa, Guttenberg, 1st, 7th, 8th and 12th; Tabor, 28th. Ky. Benettsville, 6th and 27th. Me., Gardiner, 15th, 27th and 28th. N. H., Contoocookville, 5th. Ohio, Carthage, 1st, 7th, 11th, 13th, 14th and 20th; Cincinnati, 19th. Va., Wytheville, 3rd, 6th, 7th, 12th, 13th, 20th and 26th. Minn., Duluth, 25th. Wis., Milwaukee, 20th. Miss., Vicksburg, 28th.

*Prairie and Forest Fires*.—At Dodge City, Kan., 2nd; Oregon, Mo., 3rd; Wytheville, Va., 11th; Salem, West Va., 12th, 15th and 21st; Monticello, Iowa, 17th.

*Zodiacal Light*.—Ark., Monticello, 11th, 16th and 18th. Ill., Carbondale, 9th. Iowa, Monticello, 2nd, 3rd, and 8th to 15th; Iowa City, frequently, especially 2nd, 10th and 13th. Kan., Ellinwood, 2nd, 3rd and 4th. Md., Emmitsburg, 10th; Sandy Springs, first noticed 5th, and continued for two weeks. Mass., Somerset, 4th, 6th, 8th, 10th, 11th, 13th and 14th; Westboro, 9th, 10th and 11th; Cambridge, 6th, 8th, 9th, 11th, 15th and 16th. Mich., Adrian, 3rd, 7th, 8th, 10th, 12th, 13th and 28th. Mo., Corning, 1st, 2nd, 3rd, 10th and 12th; Oregon, 1st, 3rd, 6th, 9th, 10th, 11th, 12th and 17th. Neb., Clear Creek, 1st, 3rd, 5th, 6th, 8th, 9th and 10th. N. H., Contoocookville, 14th. N. J., Trenton, 7th and 14th; Freehold, 6th, 9th, 11th and 13th; Atco, 7th, 8th, 9th, 10th, 11th, 13th and 14th. N. Y., Waterburgh, 4th, 5th, 6th, 8th, 9th and 14th; Malone, 14th. Ohio, Bellfontaine, 2nd, 3rd, 6th, 7th, 8th, 9th to 14th and 16th; Urbana, 2nd, 4th, 9th, 12th, 14th and 15th; Carthage, 4th, 6th, 7th, 8th, 9th, 10th and 12th. Va., Wytheville, 1st, 10th, 12th, 15th and 28th.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

Brig. Gen. (Bot. Assg<sup>d</sup>.) Chief Signal Officer, U. S. A.

Copy furnished for

1. The first of these is the fact that the United States has a large and growing population of people who are not citizens of the United States. This is a result of the large number of immigrants who have come to the United States in recent years, and the fact that many of these immigrants are not naturalized citizens.

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